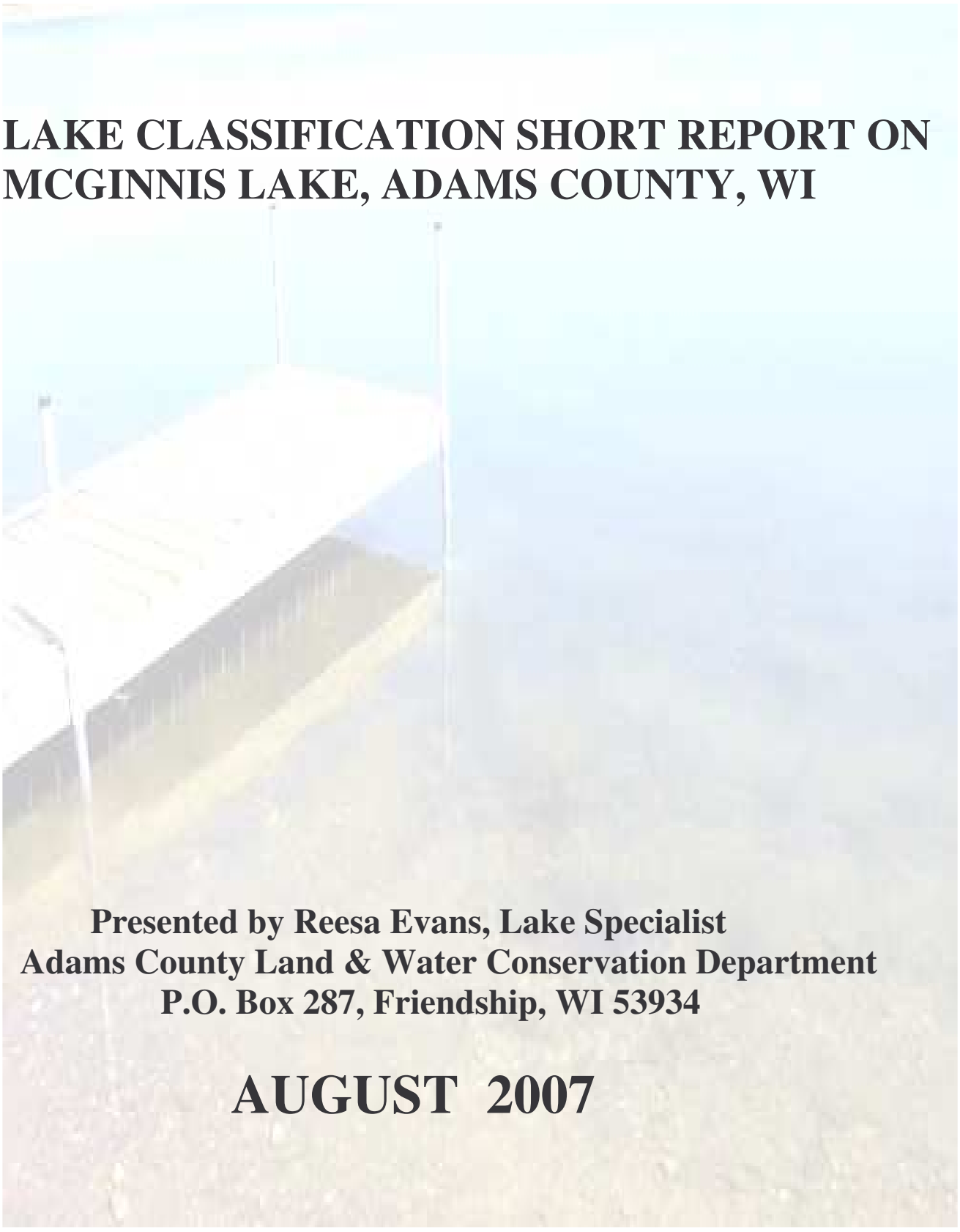
LAKE CLASSIFICATION SHORT REPORT ON MCGINNIS LAKE, ADAMS COUNTY, WI



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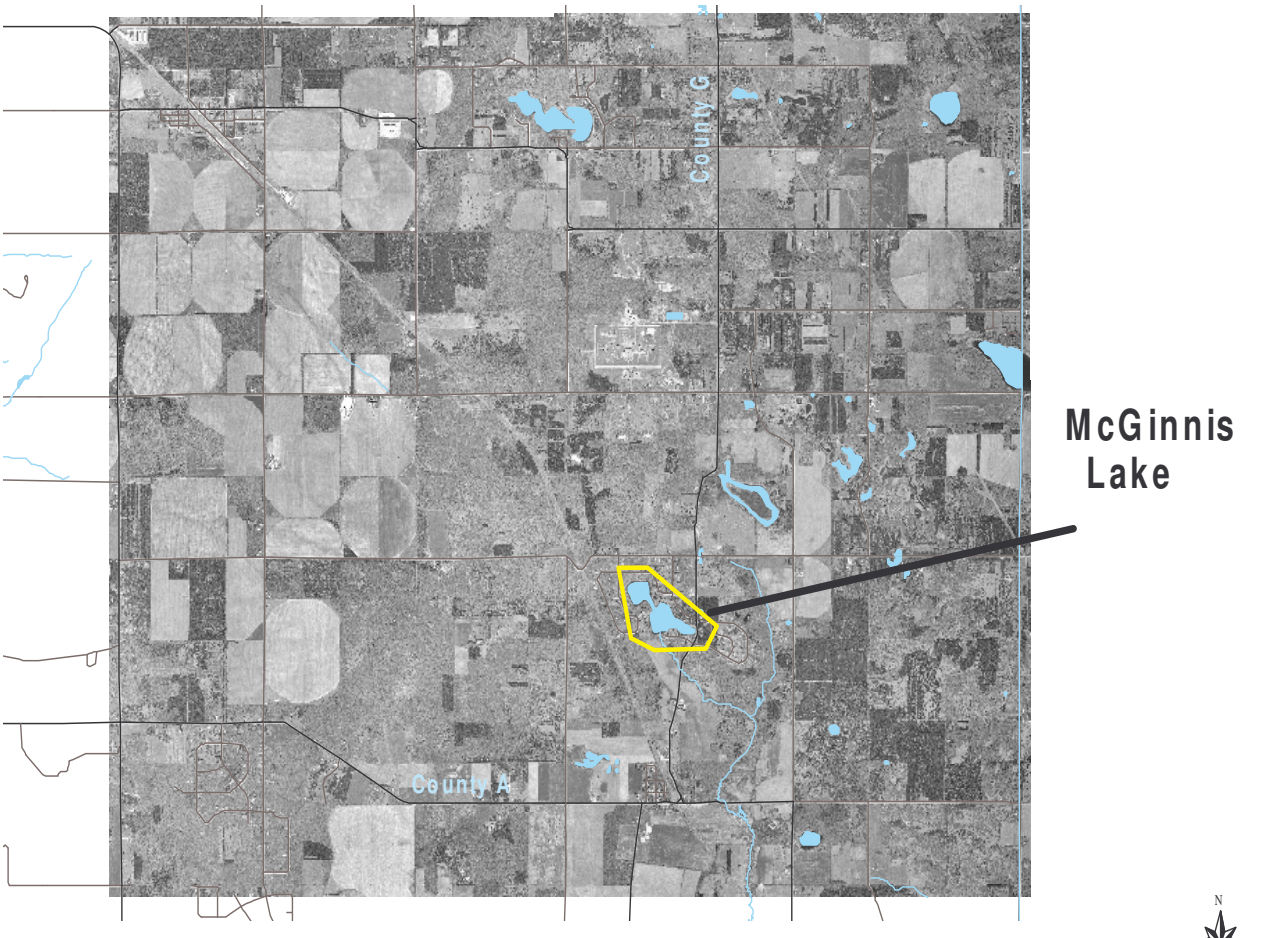
Introduction

Information about McGinnis Lake: McGinnis Lake is located in the Town of New Chester, Adams County, WI (T16N, R7E, S27), in the south central part of Wisconsin. The impoundment is 33 surface acres in size. Maximum depth is 28', with an average depth of 9'. The dam is owned and maintained by Adams County. There is a public boat ramp located on east end of the lake owned by The Adams County Parks Department. Most of the lake's shore is developed into residences.



RE:2/07

Land Use

While the surface watershed of McGinnis Lake is fairly small, the ground watershed extends east and north up to just south of Grand Marsh. Studies have shown that lakes are products of their watershed; land use in a watershed has a great impact on the water quality of that lake, especially in the amount and content of stormwater runoff from the surface. Runoff volume is affected by the amount of impervious surface, the soil type and the slope of the area.

Land use in acres and percent of total is shown on the chart below:

	Surface		Ground		Total	
McGinnis Lake	**acres**	**% of total**	**acres**	**% of total**	**acres**	**% of total**
Agriculture--Non Irrigated	6.23	1.79%	215.53	13.63%	221.76	11.49%
Agriculture--Irrigated	0	0.00%	123.2	7.79%	123.2	6.39%
Grassland/Pasture	0	0.00%	53.6	3.39%	53.6	2.78%
Residential	249.75	71.67%	133.49	8.44%	383.24	19.86%
Water	32.68	9.38%	4.72	0.30%	37.4	1.94%
Woodland	59.79	17.16%	1050.33	66.45%	1110.12	57.54%
total	348.45	100.00%	1580.87	100.00%	1929.32	100.00%

Residential land use is the most common land use category in the McGinnis Lake surface watershed, especially around the lake itself, where residential land use is most concentrated. This land use category, in some instances, may also contribute a significant amount of nutrients to the water from stormwater runoff, mowed lawns, and impervious surfaces.

A small amount of the surface watershed for McGinnis Lake is used for non-irrigated agriculture (1.95%). Agriculture may contribute significantly to the amount of nutrients in a water body.

Forested land is the largest land use category in the ground watershed of McGinnis Lake. Since forest floors are often full of leaves, needles and other duff, runoff from forested lands is may be more filtered than that from agricultural or residential lands.

The other significant land use in the ground watershed is non-irrigated agriculture. As noted above, this land use may be a significant contributor of nutrients to a lake.

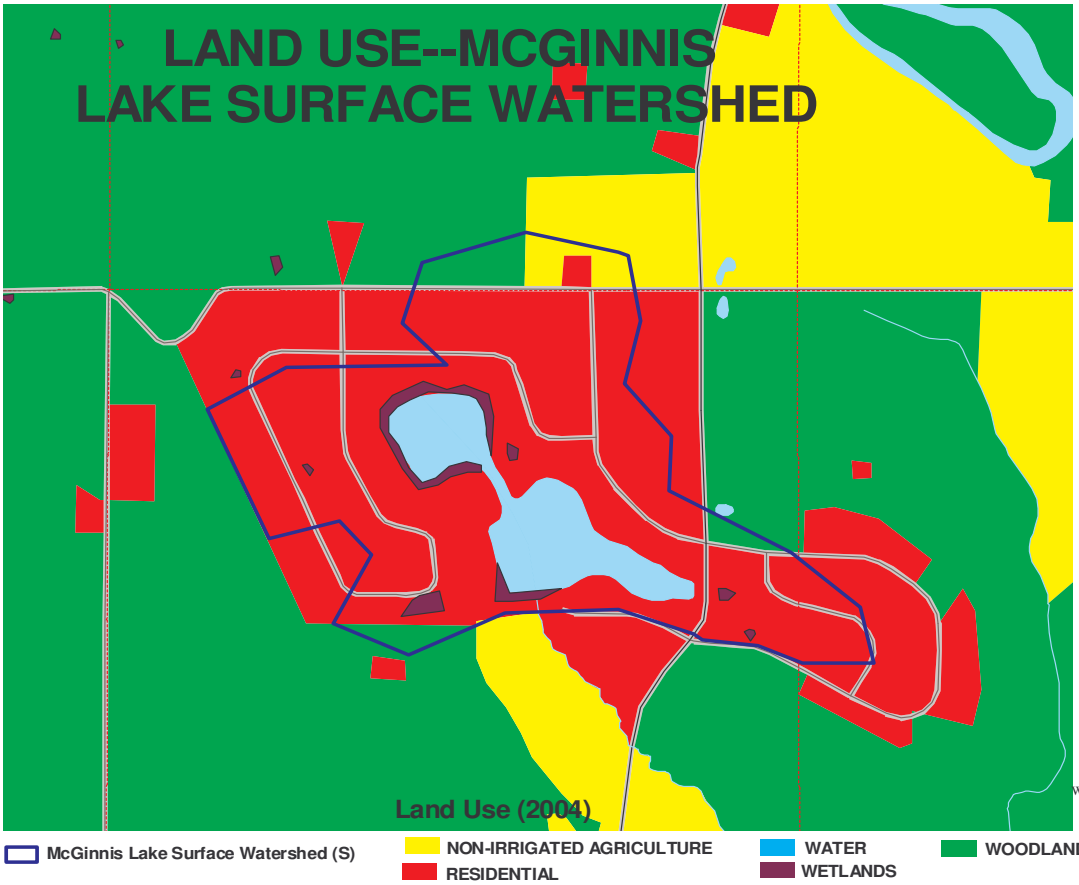
Like many lakes in Wisconsin, McGinnis Lake is a phosphorus-limited lake. This means that of the pollutants that end up in the lake, the one in the shortest supply and most affects the overall quality of the lake water is phosphorus. Land use types play a major role in determining the amount of phosphorus being loaded into the lake. Based on recent statistics and computer modeling, currently both the ground watershed and aging septics are the greatest contributors of phosphorus to McGinnis Lake

Some aspects of phosphorus loading can't be modified by human behavior—they are simply part of the natural landscape. However, phosphorus loading from agriculture, residences and septic use of the land can be decreased or increased by human activities.

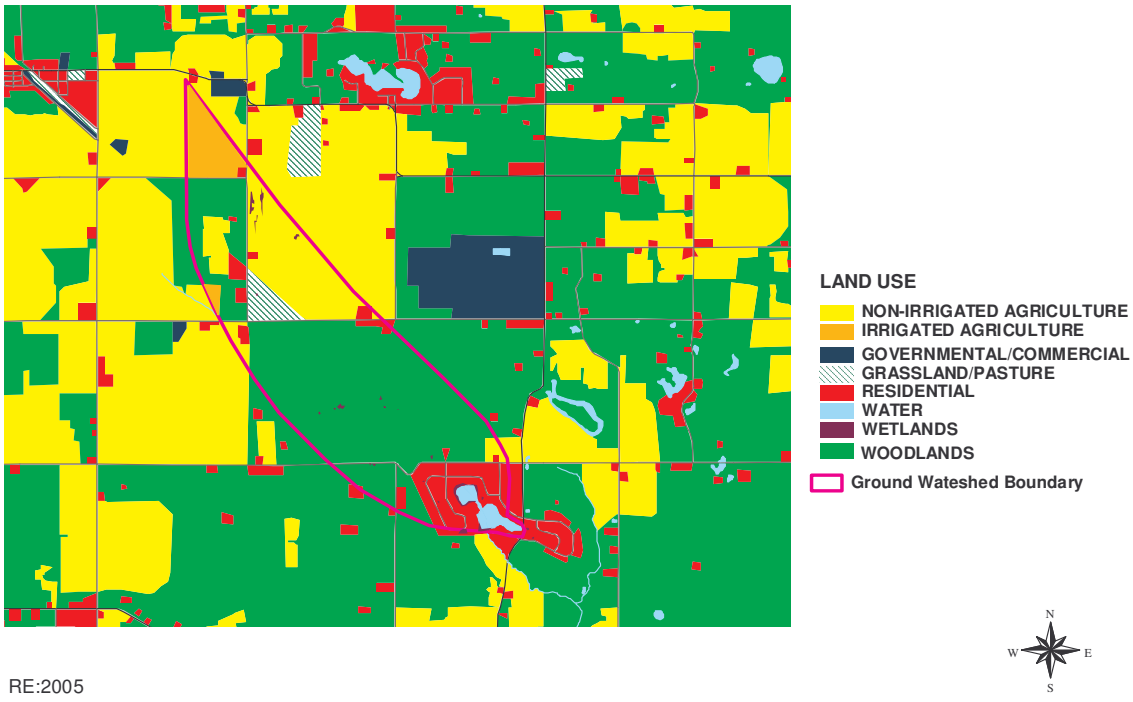
MOST LIKELY PHOSPHORUS LOADING		
BY LAND USE	%	current
Agriculture--Non Irrigated	1.9%	2.2
Residential	5.4%	4.4
Groundwatershed	61.3%	70.4
Woodland	2.3%	2.2
Lake Surface	3.8%	4.4
Septic	25.3%	29.04
total in pounds/year	100.0%	112.64

Decreasing the phosphorus load of agricultural, residential and septic use by just 10% reduces the phosphorus load per acre per year by 10.6 pounds. This may not initially sound like much—unless one realizes that one pound of phosphorus can product up to 500 pounds of algae. A reduction of 10.6 pounds of phosphorus translates into 300 pounds **less** algae per year!

LAND USE	current	-10%	-25%	-50%
Agriculture--Non Irrigated	2.2	1.98	1.65	1.10
Residential	4.4	3.96	3.30	2.20
Groundwatershed	70.4	63.36	52.80	35.20
Woodland	2.2	2.20	2.20	2.20
Lake Surface	4.4	4.40	4.40	4.40
Septic	29.04	26.14	21.78	14.52
total in pounds/year	112.64	102.04	86.13	59.62



Land Use--McGinnis Lake Ground Watershed

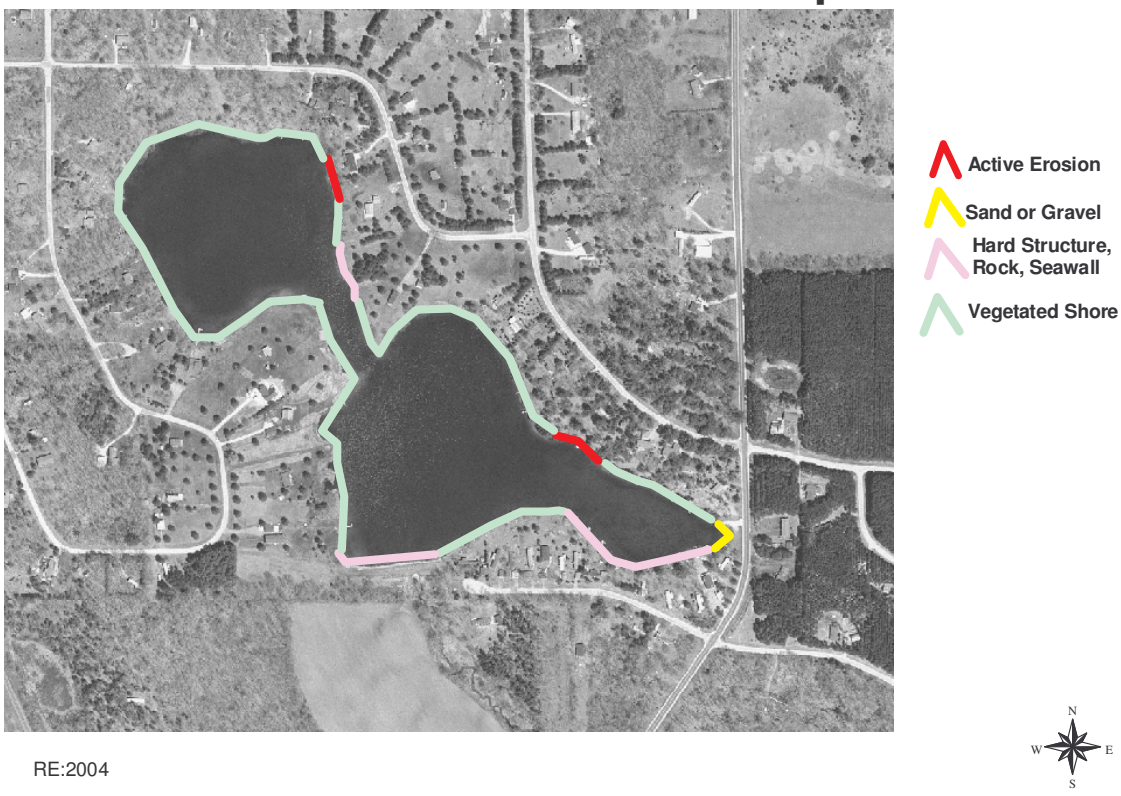


RE:2005

Shoreland

McGinnis Lake has a total shoreline of 1.4 miles (7814 feet). The entire shore of the lakeshore is in residential use. Some of the areas at the northwest of the lake (deep lobe) are steeply sloped; the land is flatter on most of the lake. Several buildings on the east lobe of the lake are located fairly closely to the lake; buildings on the north lobe tend to be further back from the shore.

McGinnis Lake Shore Map



RE:2004

Less than half (46.4%) of McGinnis Lake's shoreline is vegetated with native vegetation. A 2004 shore survey showed that a small portion of the shore had an "adequate buffer." An "adequate buffer" is a native vegetation strip at least 35 feet landward from the shore. Most of the "inadequate" buffer areas were those with mowed lawns, rock or hard structures and /or insufficient native vegetation at the shoreline to cover 35 feet landward from the water line.

Buffers on McGinnis Lake

Shoreland buffers are an important part of lake protection and restoration. These buffers are simply a wide border of native plants, grasses, shrubs and trees that filter and trap soil & similar sediments, fertilizer, grass clippings, stormwater runoff and other potential pollutants, keeping them out of the lake. A 1990 study by the Wisconsin Department of Natural Resources of Wisconsin shorelines revealed that a buffer of native vegetation traps 5 to 18 times more volume of potential pollutants than does a developed, traditional lawn or hard-armored shore. The filtering process and bank stabilization that buffers provide help improve a lake's water quality, including water clarity

Example of Adequate Buffer

Example of Inadequate Buffer

Vegetated shoreland buffers help stabilize shoreline banks, thus reducing bank erosion. The plant roots give structure to the bank and also increase water infiltration and decrease runoff. A vegetated shore is especially important when shores are steep and sandy, as are some of the McGinnis Lake shores.

Water Quality Information

One of the measures Wisconsin uses to give a general estimate of a lake's water quality is the **trophic state index.** This index looks at a lake's water clarity, its amount of total phosphorus (the element most related to aquatic plant and algal growth), and its chlorophyll-a level (chlorophyll-a is a pigment used by algae for photosynthesis).

Depending on the trophic index score, lakes are then classified as **Oligotrophic** (good)**, Mesotrophic** (fair)**,** or **Eutrophic** (poor)**.**

- **Good:** Oligotrophic lakes have clear, deep water with few algal blooms. Larger game fish are often found in such lakes.
- **Fair:** Mesotrophic lakes have more aquatic plant and algae production, with occasional algal blooms and a good fishery. The water is usually not as clear as that of oligotrophic lakes.
- **Poor:** Eutrophic lakes are very productive, with lots of aquatic plants and algae. Algal blooms are often frequent in these lakes. They may have a diverse fishery, but rough fish (such as carp) are also common. Water is often cloudy or murky. Small shallow lakes are more likely to be eutrophic.

McGinnis Lake's overall TSI is 48 →

Score	TSI Level Description
30-40	**Oligotrophic:** clear, deep water; possible oxygen depletion in lower depths; few aquatic plants or algal blooms; low in nutrients; large game fish usual fishery
40-50	**Mesotrophic:** moderately clear water; mixed fishery, esp. panfish; moderate aquatic plant growth and occasional algal blooms; may have low oxygen levels near bottom in summer
50-60	**Mildly Eutrophic:** decreased water clarity; anoxic near bottom; may have heavy algal bloom and plant growth; high in nutrients; shallow eutrophic lakes may have winterkill of fish; rough fish common
60-70	**Eutrophic:** dominated by blue-green algae; algae scums common; prolific aquatic plant growth; high nutrient levels; rough fish common; susceptible to oxygen depletion and winter fishkill
70-80	**Hypereutrophic:** heavy algal blooms through most of summer; dense aquatic plant growth; poor water clarity; high nutrient levels

Water clarity readings are usually taken by using a Secchi disk (shown at right). Average summer Secchi disk clarity in McGinnis Lake in 2004-2006 was 5.9 feet, placing it in the "good" category. Water clarity in McGinnis Lake has consistently remained in the "good" or "fair" clarity category since 1992. Water clarity can be reduced by turbidity (suspended materials such as algae and silt) and dissolved organic chemicals that color or cloud the water.

Increased phosphorus levels in a lake will feed algal blooms and also may cause excess plant growth. The 2004-2006 summer average phosphorus concentration in McGinnis Lake was 28.91 micrograms/liter. This is below the average for impoundments in Wisconsin and places McGinnis Lake in the "good" category of phosphorus levels. However, phosphorus levels need to be monitored consistently to be aware of any changes.

The third measure used in trophic state classification is the amount of chlorophyll-a contained in the lake. The amount of chlorophyll-a found in a lake is an indication about the amount of algae in the lake. The 2004-2006 summer average chlorophyll-a concentration in McGinnis Lake was 2.3 micrograms/liter. This level of chlorophyll-a gives McGinnis Lake a "very good" ranking for chlorophyll-a (i.e., it's very low).

In-Lake Habitat

Aquatic Plants

A diverse aquatic plant community plays a vital role in improving water quality, providing valuable habitat resources for fish and wildlife, resisting invasions of non-native species and checking excessive growth of the most tolerant species.

An updated aquatic plant survey was performed in 2006. The 0-1.5ft depth zone supported the most abundant aquatic plant growth. The McGinnis Lake aquatic plant community is characterized by average quality and average species diversity. *Ceratophyllum demersum* (coontail), *Myriophyllum sibiricum* (northern milfoil), and *Potamogeton crispus* (Curly-Leaf Pondweed, an invasive exotic) were the most common aquatic species.

Dense aquatic vegetation is a problem in McGinnis Lake, especially in the shallower (east) lobe. 11 aquatic species were found at more than average density where present.

Important to maintaining a healthy, diverse aquatic plant community is an integrated aquatic plant management plant that controls the invasive plants in the lake. The most prevalent invasive exotic in McGinnis Lake is currently Curly-Leaf Pondweed, which was found at all four depth levels. The other invasive plant found was *Phalaris arundinacea* (reed canarygrass), which had low occurrence frequency and low density. The most common invasive plant in Adams County, *Myriophyllum spicatum* (Eurasian watermilfoil), was not found in McGinnis Lake during the 2006 survey.

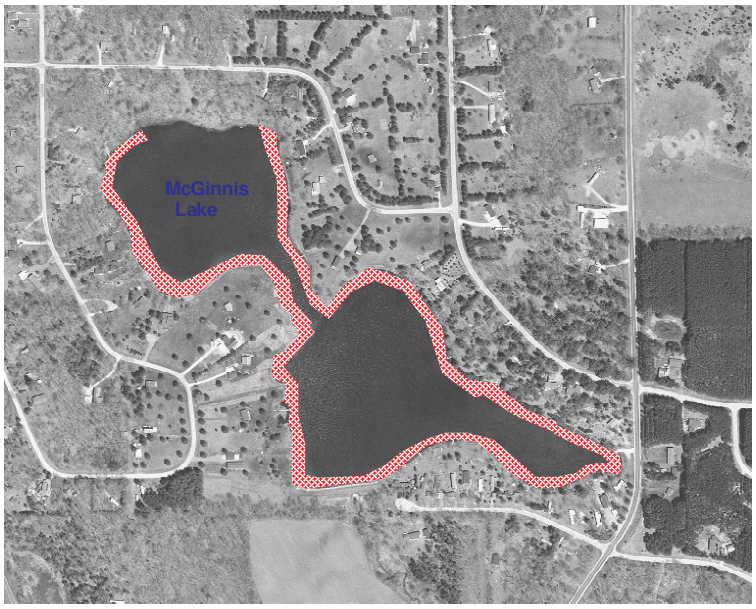
More detailed information can be found in the aquatic plant report of the 2006 survey, available on request from the WDNR or Adams County Land & Water Conservation Department.

Curly-Leaf Pondweed

Reed Canarygras & Purple Loosestrife

Eurasian Watermilfoil

Emergent Plants in McGinnis Lake 2006



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RE:11/06

Emergent Vegetation Found 2006

Floating Vegetation in McGinnis Lake 2006

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RE:11/06

Floating Aquatic Vegetation Found 2006

Submergent Plants in McGinnis Lake 2006

RE:11/06

Submergent Aquatic Vegetation Found 2006

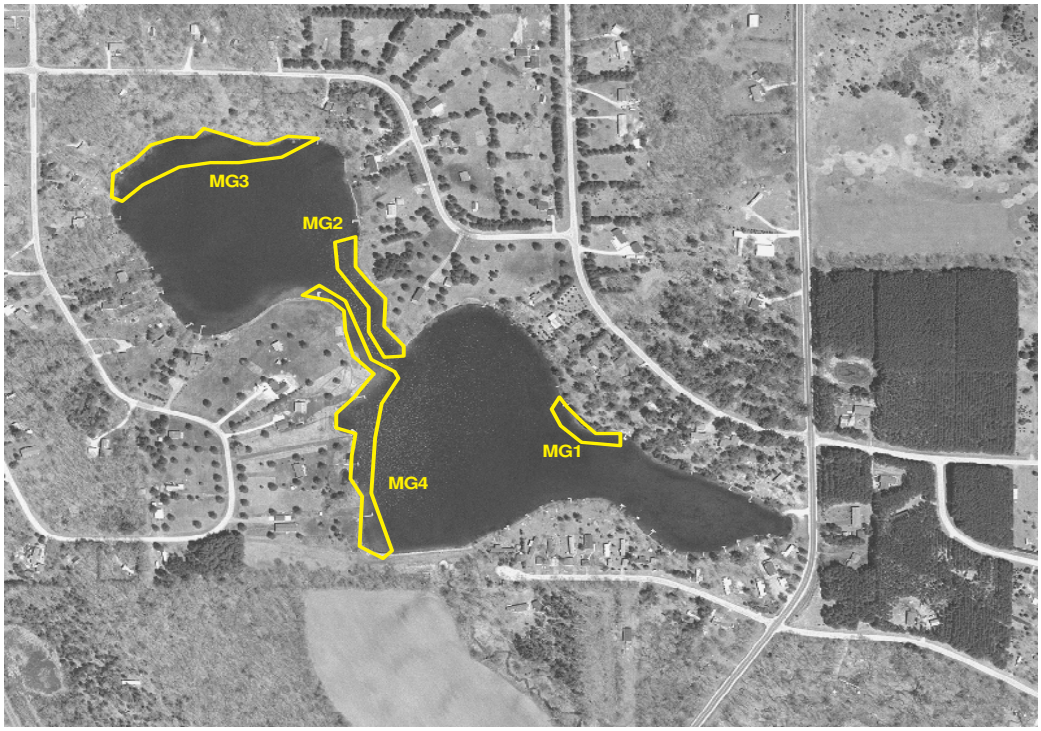
Curly-Leaf Pondweed in McGinnis Lake 2006

RE:11/06

Curly-Lead Pondweed Found 2006

Critical Habitat

McGinnis Lake: Critical Habitat Areas



re:6/07

Wisconsin Rule 107.05(3)(i)(I) defines a "critical habitat areas" as: "areas of aquatic vegetation identified by the department as offering critical or unique fish & wildlife habitat or offering water quality or erosion control benefits to the body of water. Thus, these sites are essential to support the wildlife and fish communities. They also provide mechanisms for protecting water quality within the lake, often containing high-quality plant beds. Finally, critical habitat areas often can provide the peace, serenity and beauty that draw many people to lakes in the first place.

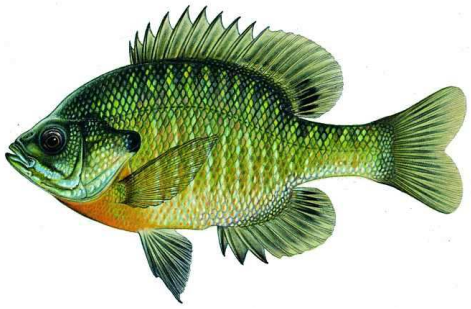
Four areas on McGinnis Lake were determined to be appropriate for critical habitat designation. MG1 extends along approximately 200 feet of the northern shoreline of the east lobe of the lake, up to the ordinary high water mark. MG2 extends along approximately 500 feet of the eastern shoreline in the narrows between the two lobes of McGinnis Lake. MG3 covers 750 feet of steep shoreline in the lake's northern lobe. MG4 goes for about 1000 feet along the west side of the narrows and the west shore of the shallow lobe of the lake.

The Critical Habitat Report for McGinnis Lake has more specific information on these sites. Copies are available from the Wisconsin Department of Natural Resources.

Fishery/Wildlife/Endangered Resources

WDNR stocking records go back to 1969, when McGinnis Lake was stocked with rainbow trout, bluegills and largemouth bass. Stocking continued into the 1990s, consisting of bluegills, largemouth bass and northern pike. Fish inventories go back to 1963, when the WDNR made the following findings: bluegill and largemouth bass abundant; blackchin shiner, brassy minnow and sunfish common; mud minnow, perch and sucker scarce. A 1980 inventory recommended the installation of an aeration system because of the history of low oxygen and fish kills. Other inventories through the years also found bullheads and pumpkinseed. The most recent inventory revealed that bluegills were the most abundant fish, largemouth bass were common and pumpkinseeds were scarce.

Muskrat are also known to use McGinnis Lake shores for cover, reproduction and feeding. Seen during the field survey were various types of waterfowl and songbirds. Frogs and salamanders are known, using the lake shores for shelter/cover, nesting and feeding. Turtles and snakes also use this area for cover or shelter in this area, as well as nested and fed in this area. Upland wildlife feed and nest here as well. One endangered species, *Cincindela patruela* (tiger beetle), is reported in the McGinnis Lake watersheds.



BLUEGILL

LARGE-MOUTH BASS

Recommendations

Lake Management Plan & Issues

- The current lake management plan needs to include at least the following aspects concerning the management of the lake: aquatic species management (using integrated approach); control/management of invasive species; wildlife and fishery management; nutrient budgeting; shoreland protection; critical habitat protection; water quality protection.
- The landowners and McGinnis Lake Association should consider forming a lake district to provide a more stable funding source for lake management practices.

Watershed Recommendations

- Since computer modeling results suggest that input of nutrients, especially phosphorus, are a factor that needs to be explored for McGinnis Lake, it is recommended that both the surface and ground watersheds be inventoried, documenting any of the following: runoff from any livestock operations that may be entering the surface water; soil erosion sites; agricultural producers not complying with nutrient management plans and/or irrigation water management plans.
- If such sites are documented, McGinnis Lake Association should encourage Adams County LWCD and landowners to design & implement plans to address site issues.

Water Quality Recommendations

- All lake residents should practice best management on their lake properties, including keeping septic systems maintained in proper condition and pumped every three years, eliminating the use of lawn fertilizers, cleaning up pet wastes and not composting near the water.
- Reducing the amount of impervious surface around the lake and management of stormwater runoff will also help maintain water quality.
- Residents should become involved in the Citizen Lake Water Monitoring Program. This program includes training in water quality monitoring, invasive species monitoring, and Clean Boats, Clean Waters.
- Lake residents should protect and restore natural shoreline around McGinnis Lake. A substantial restoration of natural shore would assist in improving water quality and might also help in reducing the density of aquatic growth.

Aquatic Plant Recommendations

- All lake users should protect the aquatic plant community in McGinnis Lake by assisting in implementing an integrated aquatic plant management plan that uses multiple methods of control.
- The McGinnis Lake Association should maintain exotic species signs at the boat landings and contact DNR if the signs are missing or damaged.
- The McGinnis Lake Association should monitor for Curly-Leaf Pondweed and maintain the most effective methods and modify if necessary. Residents may need to hand-pull scattered plants.
- Lake residents should get involved in the county-sponsored Citizen Aquatic Invasive Species Monitoring Program. This will allow not only noting changes in the Curly-Leaf Pondweed pattern, but also those for Eurasian watermilfoil and Reed canarygrass Noting the presence and density of invasive species early is the best way to take preventive action to keep them from becoming a bigger problem.

Critical Habitat Recommendations

- Maintain current habitat for fish and wildlife.
- Leave fallen trees along shoreline & in water.
- Seasonal protection of spawning habitat. No disturbance of littoral zone except for viewing/access corridor and/or WDNR-approved projects.
- Maintain the wildlife corridor.
- Protect emergent vegetation.
- Restore shore buffers of native vegetation.
- Seasonal control of exotics. Regular monitoring for exotics.
- No bank grading or grading of adjacent land.
- For shore protection, use of biogineering only, rather than hard structure.
- Maintain aquatic vegetation in undisturbed condition for wildlife habitat, fish use and water quality protection.
- Maintain lake no-gas motor designation.
- If additional piers will be installed in these areas, light-penetrating materials only should be used.